

1.3 Use Midpoint and Distance Formulas

$$AB = 2$$

$$|0 - -2| = 2$$

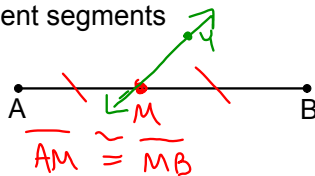


$$\text{midpt of } AD = \frac{-2+4}{2} = 1$$

Find midpoint-average coordinates
Find distance-subtract coordinates

Midpoint of a Segment

Midpoint—point that divides a segment into two congruent segments



Segment Bisector—a point, ray, segment, line, or plane that intersects a segment at its midpoint

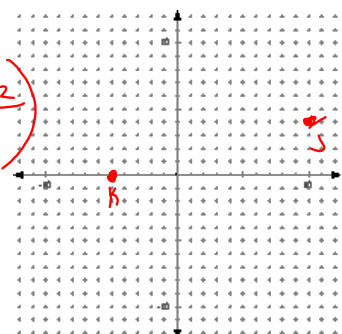
\overleftrightarrow{MY} bisects \overline{AB}

Find the midpoint.
J(10,4) K(-5, 0)

$$M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$\frac{10+(-5)}{2}, \frac{4+0}{2}$$

$$M\left(\frac{5}{2}, 2\right)$$



Do Find the midpoint

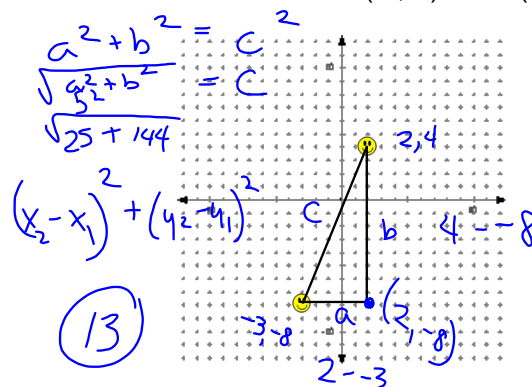
1. $(4, -6)$ $(-3, 2)$

2. $(-4, -3)$ $(8, 5)$

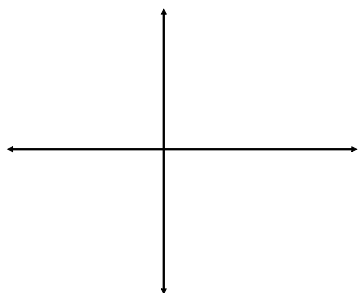
$(2, 1)$

$(\frac{1}{2}, -2)$

Find the distance between A(-3,-8) and B(2,4).



In General:



The distance formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Find MN and OP

Do

1. M(-5, -2) N(1, 4)

2. O(-1, -1) P(20, 6)

$$MN = \sqrt{(1 - -5)^2 + (4 - -2)^2}$$

$$\sqrt{72} = 6\sqrt{2}$$

$$OP = \sqrt{(20 - -1)^2 + (6 - -1)^2}$$

$$\sqrt{441} = 21$$

M is the midpoint of \overline{UD}

U(5, 2) M(3, -1) D(x, y)

$$\frac{5+x}{2} = 3$$

$$5+x = 6$$

$$x = 1$$

$$(1, -4)$$

$$\frac{2+y}{2} = -1$$

$$2+y = -2$$

$$y = -4$$

M is the midpoint of \overline{UD}

U(-1, 2) M(-6, 8) D(?, ?)

Do

1. U(-5, -3) M(-6, 4) Find D $(-7, 11)$

2. ~~M(-3, 3)~~ D(-14, 12) Find U $(8, -6)$

HW

p19-20

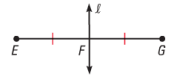
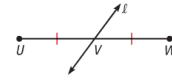
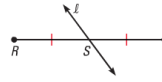
#s 3-5, 11-15, 17, 18, 25-27, 31-33, 43

FINDING LENGTHS Line ℓ bisects the segment. Find the indicated length.

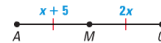
3. Find RT if $RS = 5\frac{1}{8}$ in.

4. Find UW if $VW = \frac{5}{8}$ in.

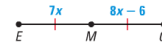
5. Find EG if $EF = 13$ cm.

**ALGEBRA** In each diagram, M is the midpoint of the segment. Find the indicated length.

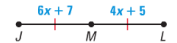
11. Find AM .



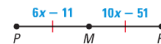
12. Find EM .



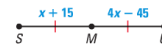
13. Find JM .



14. Find PR .



15. Find SU .

**FINDING MIDPOINTS** Find the coordinates of the midpoint of the segment with the given endpoints.

17. $C(3, 5)$ and $D(7, 5)$

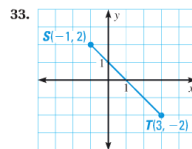
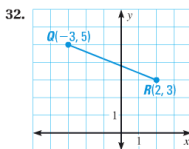
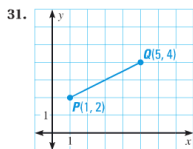
18. $E(0, 4)$ and $F(4, 3)$

FINDING ENDPOINTS Use the given endpoint R and midpoint M of \overline{RS} to find the coordinates of the other endpoint S .

25. $R(3, 0)$, $M(0, 5)$

26. $R(5, 1)$, $M(1, 4)$

27. $R(6, -2)$, $M(5, 3)$

DISTANCE FORMULA Find the length of the segment. Round to the nearest tenth of a unit.**COMPARING LENGTHS** The endpoints of two segments are given. Find each segment length. Tell whether the segments are congruent.

43. \overline{AB} : $A(0, 2)$, $B(-3, 8)$

\overline{CD} : $C(-2, 2)$, $D(0, -4)$